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(54) Title: PROGRAMMABLE ALERT FOR A COMMUNICATION DEVICE		
<pre> graph TD 100 --- 102 102 --- 103 103 --- 104 104 --- 107 104 --- 106 104 --- 105 104 --- 101 </pre>		
(57) Abstract		
<p>A communication device (100), comprises a receiver (103) for receiving a message, an alert generator (107) for presenting an alert, and a display (106) for displaying received messages and other information. The communication device (100) is capable of programming the alert using the display (106) for visual programming feedback, consequently displaying a musical staff and associated musical note representations.</p>		

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PROGRAMMABLE ALERT FOR A COMMUNICATION DEVICE

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Field of the Invention

This invention relates in general to the field of communication devices capable of displaying information and presenting alerts, and more specifically to those communication devices capable of 10 programming the alerts.

Background of the Invention

A communication device (e.g., a selective call receiver), typically 15 presents an alert to a user of the device using any combination of an audible alert, a visual alert, and a tactile alert. Typically, the audible alert comprises a constant tone frequency having a predetermined alert cadence and duration. The tactile alert, similarly, comprises a dominant frequency vibratory alert also having a predetermined alert cadence and 20 duration. The conventional visual alert may be presented via a display or other visual indicating device (e.g., a light emitting diode (LED) or a lamp). Normally, a conventional light source with dominant frequency emissions in the visible light spectral range illuminates the display, the visual alert optionally flashing the visible information (i.e., "ON" and 25 "OFF" pattern), in a predetermined cadence and duration.

Selective call receivers are such a part of our life today that an audible alert heard by a group of people having selective call receivers, does not clearly identify the intended receiving party of the message. Typically, confusion results causing a number of individuals to 30 erroneously reach for their receivers which have not received a message.

This frustration is aggravated by the lack of programmability of alerts afforded the user of conventional selective call receivers. In those instances where the alert is programmable, it is programmed by the manufacturer either in the hardware configuration of the device or in 35 the read-only-memory (ROM) of a controller within the communication device. Therefore, the user of the product is constrained to "standard"

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alert choices, as programmed by the manufacturer of the communication device. Hence, the problem persists in contemporary communication devices.

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Summary of the Invention

In carrying out one form of this invention, there is provided a communication device, comprising receiver means for receiving a message, alert means for presenting an alert, display means for displaying the received messages and other information, and means for programming the alert using the display means for visual programming feedback.

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Brief Description of the Drawings

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FIG. 1 is a block diagram of an exemplary communication device (e.g., a selective call display receiver), in accordance with an embodiment of the present invention.

FIG. 2 is a front view of the selective call display receiver of FIG. 1.

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FIG. 3A illustrates a 5 by 7 matrix capable of displaying representations of a musical staff and musical notes in accordance with the present invention.

FIG. 3B is an exemplary sixteen character display, illustrating musical notes to compose a custom alert.

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FIG. 4 is a flowchart of an operational sequence according to one embodiment of the invention.

FIG. 5 is a block diagram of a programming computer interfacing with the communication device in an alternate embodiment of the present invention.

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Description of a Preferred Embodiment

Referring to FIG. 1, a block diagram of a communication device 100 (e.g., a selective call display receiver) is shown, in accordance with an embodiment of the present invention. A battery (101) powered selective call receiver 100 operates to receive a signal via an antenna 102. The received signal is routed from the antenna 102 to a receiver 103. The receiver 103 demodulates the received signals using conventional techniques and forwards the demodulated signal to a control circuit 104, which decodes and recovers information contained within the received signal. In accordance with the recovered information and user operated controls (105), the selective call receiver presents at least a portion of the information, such as by a display 106, and signals the user via an audible or sensible alert 107 that a message has been received. The user may then view the information presented on the display 106.

The control circuit 104 shown in FIG. 1 preferably includes signal multiplexing integrated circuits, a microcomputer, a digital memory coupled to the microcomputer, environmental sensing circuitry such as for light or temperature conditions, audio power amplifier circuitry, control interface circuitry, and display illumination circuitry. These elements are arranged in a known manner which when assembled provides the display information receiver as requested by the customer.

Referring to FIG. 2, a front view of the selective call display receiver 100 of FIG. 1 illustrates two user operated controls 105 (e.g., two push buttons), capable of receiving alert programming information from the user of the communication device 100. The "up-arrow" user control 202 and the "right-arrow" user control 204 may be used to program the frequency, cadence, and duration of the audible alert, for example, as will be more fully discussed below.

Referring to FIGs. 3A and 3B, in this embodiment of the present invention the display 106 comprises 5 by 7 matrix cells 300, normally used to display character representations (e.g., numeric and/or alphanumeric characters), which may be part of the recovered information and presented as the received message. Each character displayed normally requires one 5 by 7 matrix cell 300. A couple of the seven row and five column display drivers (not shown) may selectively

illuminate a pixel 302 within a cell 300. Each pixel 302 illumination is typically controlled by a different pair of row and column drivers.

To program an exemplary audible alert in accordance with the invention, the illumination of the pixels 302 within the cell 300 may

5 serve as visual programming feedback. Thus, the arrangement of pixels 302 and concatenated cells 300 (refer to FIG. 3B), in an exemplary sixteen character display 106 may mimic a musical composition, thereby visually aiding the programming of an audible alert into the selective call display receiver 100.

10 In this way, representations of a musical staff and musical notes may conform to the 5 by 7 matrix cell 300 arrangement. The musical notes on the musical staff may be represented by pixels 302 illuminated within the cell 300. For example, the lowest row pixels 304 may represent the musical note E and successive musical notes may be represented by
15 increasingly higher row pixels 306 (e.g., F, G, A, B, C, and D), similar to a musical staff representation.

20 Additionally, each musical note may be represented by an illuminated pixel 302, and each pause or rest period may be represented by all darkened pixels for a particular column, where each column of pixels represents a time frame. Therefore, the concatenation of illuminated and darkened pixels mimic a musical composition, such as illustrated in FIG. 3B.

25 The two illustrated user operated controls (202 and 204) may be used to program the audible alert using the display 106 and musical note representations for visual programming feedback. The "up-arrow" user control 202 may serve to scroll through the musical note choices for a particular time frame. A flashing (e.g., blinking "ON" and "OFF" pattern) pixel 302 may indicate the current note for the time frame. To program the note the user may push and hold the user control 202 until
30 the pixel 302 stops flashing. Once a note is selected for a particular time frame, the "right-arrow" user control 204 may advance to the next time frame. Advancing to the next time frame without programming a musical note in the current time frame preferably indicates a rest period or pause for the current time frame. Therefore, in this fashion the
35 exemplary audible alert may be programmed into the communication device 100 using the display 106 for visual programming feedback.

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Referring to FIG. 4, a flowchart of an exemplary alert programming sequence is shown, according to an embodiment of the present invention. Once the selective call display receiver 100 is turned "ON" and within a predetermined time interval thereafter, user controls 202 and 204 are monitored 400. In the preferred embodiment, if both user controls 202 and 204 are pushed and held, the selective call display receiver enters an audible alert programming mode 400. User control 202 is used to select the current note 402, and user control 204 advances to the next time frame on the musical staff representation 406, as described earlier. When both user controls (202 and 204) are pressed and held 404, the selective call display receiver exits the programming mode and emits the audible alert 408 (musical composition).

Referring to FIG. 5, a block diagram illustrates a programming computer 500 (e.g., a personal computer, a video display terminal, or other console), interfacing with the communication device 100 preferably via the control circuitry 104, in an alternate embodiment of the present invention. The programming computer 500 interfaces with the control circuitry 104 via a conventional connector (not shown) at the communication device 100. A conventional computer communication protocol (e.g., RS-232 and RS-422 protocol), may be used to send the alert programming information from the programming computer 500 to the communication device 100, with the display 106 providing visual programming feedback. In this inventive configuration, the user of the communication device 100 may enter the audible alert programming information using the programming computer 500, such as a personal computer, having the display 106 provide visual programming feedback.

In similar fashion to programming the audible alert, other types of alerts may be programmed. For example, the alert frequency, cadence, and duration for the tactile alert may be programmed accordingly. Similarly, the visual alert frequency, cadence, and duration may also be programmed at the communication device 100. Therefore, using the heretofore discussed invention the user of the communication device 100 is capable of effectively programming the alert at the communication device 100.

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CLAIMS

1. A communication device, comprising:
receiver means for receiving a message;
5 alert means for presenting an alert;
display means for displaying the received messages and other information; and
means for programming the alert using the display means for visual programming feedback.
10
2. The device of claim 1, wherein the display means comprises a liquid crystal display.
- 15 3. The device of claim 1, wherein the visual programming feedback comprises a musical staff and associated musical note representations.
- 20 4. The device of claim 1, wherein the programming means comprises at least one push button.
5. The device of claim 1, wherein the programming means comprises an interface at the communication device capable of receiving computer communication.
- 25 6. The device of claim 5, further comprising an external programming computer capable of receiving alert programming information and sending the alert programming information to the communication device using computer communication at the interface.
- 30 7. The selective call receiver of claim 1, wherein the alert means comprises an audible alert generator.
8. The selective call receiver of claim 1, wherein the alert means comprises a tactile alert generator.
- 35 9. The selective call receiver of claim 1, wherein the alert means comprises a visual alert indicator.

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10. A method for programming an alert for a communication device having display means, comprising the steps of:
 - receiving an alert programming information at the
 - 5 communication device; and
 - displaying the alert programming information using the display means.
- 10 11. The method of claim 10, wherein the displaying step further comprises the step of displaying a musical staff and associated musical note representations.
- 15 12. The method of claim 10, wherein the receiving step comprises the step of sensing a user input at the communication device.
- 20 13. The method of claim 10, wherein the receiving step comprises the step of detecting computer communication at the communication device.
- 25 14. A selective call receiver, comprising:
 - a receiver for receiving a message;
 - an alert generator for presenting an alert;
 - a display for displaying the received messages and other information; and
 - means for programming the alert using the display means for visual programming feedback.
- 30 15. The selective call receiver of claim 14, wherein the display comprises a liquid crystal display.
- 35 16. The selective call receiver of claim 14, wherein the visual programming feedback comprises a musical staff and associated musical note representations.
17. The selective call receiver of claim 14, wherein the programming means comprises at least one push button.

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18. The selective call receiver of claim 14, wherein the programming means comprises an interface at the communication device capable of receiving computer communication.

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19. The selective call receiver of claim 18, further comprising an external programming computer capable of receiving alert programming information and sending the alert programming information to the communication device using computer communication at the interface.

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20. The selective call receiver of claim 14, wherein the alert generator comprises an audible alert generator.

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21. The selective call receiver of claim 14, wherein the alert generator comprises a tactile alert generator.

22. The selective call receiver of claim 14, wherein the alert generator comprises a visual alert indicator.

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23. A communication device, comprising:
a receiver for receiving a message;
an alert generator for presenting an alert;
a display for displaying received messages and other information;

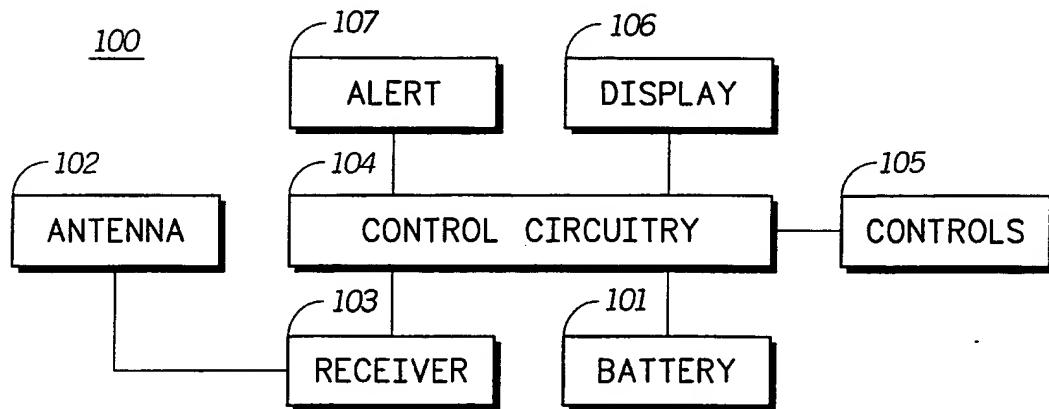
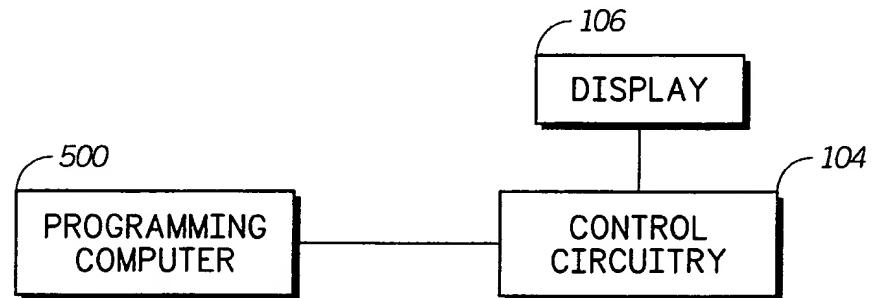
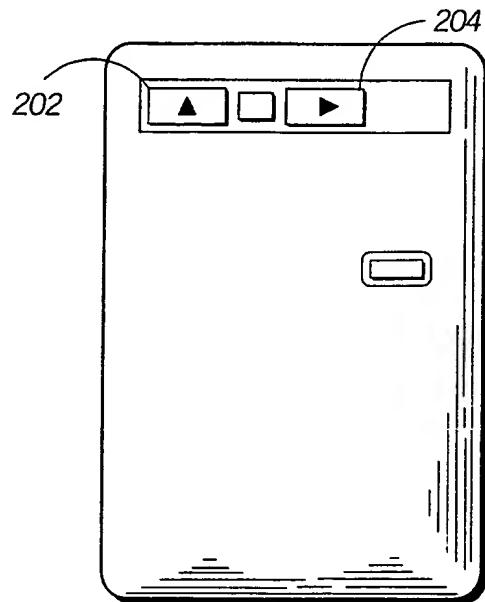
5 and

means for programming the alert using the display for visual
programming feedback, consequently displaying a musical staff and
associated musical note representations.

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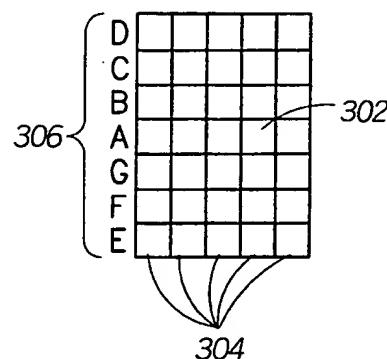
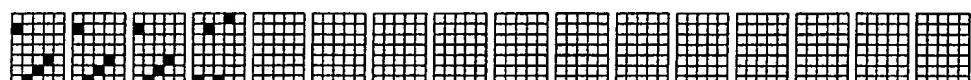
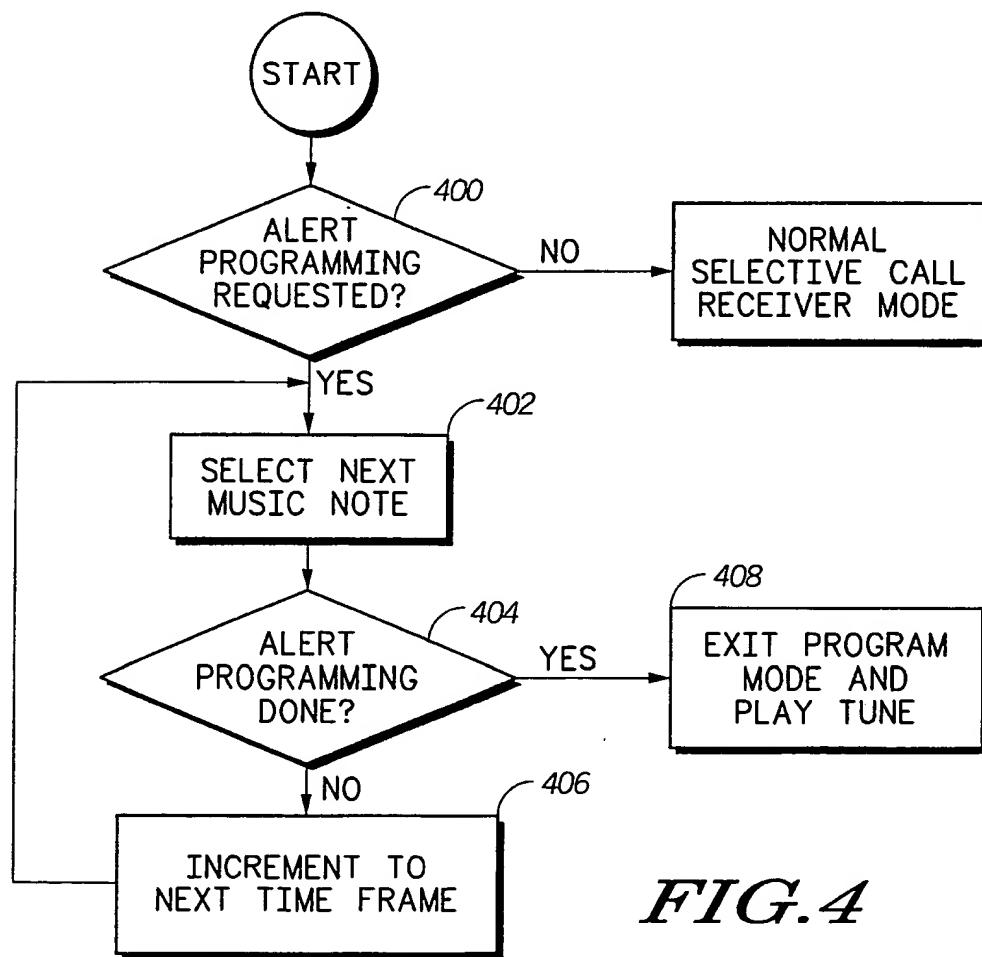
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*FIG.1**FIG.5**FIG.2*

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300***FIG. 3A******FIG. 3B***

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US91/05120

I. CLASSIFICATION OF SUBJECT MATTER		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC(5): H04Q 7/00		
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Classification Scheme	Classification Symbols	
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II. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of Document, " with indication, where appropriate, of the relevant passages	Relevant to Claim No.
Y	US, A, 4,368,989 (KAWASHIMA) 18 JANUARY 1983 See abstract; col. 1, lines 43-70; figs. 5a-5d col. 6, lines 11-43.	1-23
Y	US, A, 4,868,561 (DAVIS) 19 SEPTEMBER 1989 See col. 2, lin 60 to col. 3, lines 25 col. 5, lines 1-3 and claim 5.	1-23
Y	US, A, 4,388,000 (HAGIHARA) 14 JUNE 1983 See entire document.	1-23
A	JP, A, 1-321484 (NAKADA) 27 DECEMBER 1989 See abstract.	1-23
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